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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/790,606

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Jiong-Ping Lu

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TEXAS INSTRUMENTS INCORPORATED

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DALLAS, TX 75265

EXAMINER

TRAN, LONG K

ART UNIT

PAPER NUMBER

2818

DATE MAILED: 11/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/790,606	Applicant(s) LU, JIONG-PING	
	Examiner Long K. Tran	Art Unit 2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 20 is/are pending in the application.
- 4a) Of the above claim(s) 1 - 9, 17 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 10-12, 16, 18 and 19 is/are rejected.
- 7) ☒ Claim(s) 13 - 15 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: ____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date: ____. | 6) <input type="checkbox"/> Other: ____. |

Claim Objections

1. Each of claims **11** and **12** recites a “blanket”, which by definition, anything that covers. For examination purposes, a layer cover the underlying layer is considered to be a blanket.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claim **10**, **11** and **19** are rejected under 35 U.S.C. 102(e) as being anticipated by Amos et al. (US Patent No. 6,846,734).
4. Regarding claim **10**, Amos discloses a method for manufacturing a semiconductor device, comprising:

placing a gate oxide 18 (figures 3 – 16) over a substrate 10 (figure 1); and
forming a silicided gate electrode 38 (fig. 10C) over said gate oxide 18, said silicided gate electrode including a first metal 34 (figure 8; column 6, lines 41 - 53) and a second metal 36 (figure 8; column 6, lines 63 – 67 and column 7, lines 1 – 8).

Regarding claim **11**, Amos discloses depositing a blanket of polysilicon material 20 (figures 3 – 16; column 5, line 55) over a blanket of gate oxide 18, depositing a blanket of a cobalt-nickel bilayer 34 and 36 over the blanket layer of polysilicon material

20, and annealing the layers to form a blanket of silicided gate electrode material 38 including cobalt and nickel. See column 6, lines 41 – 67; column 7, lines 1 – 36 and 62 – 67; and column 8, lines 1 – 15.

Regarding claim **19**, Cabral discloses forming source/drain regions 28 (figures 4 – 16) in the substrate 14 and forming silicided source/drain contact 52 (figures 12 – 16) regions in the source/drain regions 28 subsequent to forming the silicided gate electrode 62 (figures 14 – 16). See column 8, lines 35 – 67; column, lines 1+; and column 10, lines 1 – 50.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim **12** is rejected under 35 U.S.C. 103(a) as being unpatentable over Amos et al. (US Patent No. 6,846,734) in view of Thakur (US. Patent no. 6,028,002).

7. Regarding claim **12**, Cabral discloses the claimed invention of claims 10 and 11 except for patterning said blanket layer of silicided gate electrode material to form a silicided gate electrode.

However, Thakur shows a silicided stacked gate electrode comprising layers 22, 23, 24 (metal silicide), and 25 being patterned and etched to form metal silicided gate electrode 31 (figure 3; column 3, lines 38 – 40).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide a step of patterning a blanket layer of silicided gate electrode material as shown by Thakur for patterning the blanket layer of silicided gate electrode material of Cabral, in order to complete the process of forming the transistor gate (column 4, lines 29 – 31).

8. Claim **16** is rejected under 35 U.S.C. 103(a) as being unpatentable over Amos et al. (US Patent No. 6,846,734) in view of Maa et al. (US Patent No. 6,534,871).

9. Regarding claim **16**, Amos discloses the claimed invention of claims 10 and 11 but fails to disclose a ratio of a thickness of the cobalt layer to a thickness of the nickel layer ranges from about 9:1 to about 2:3 as cited in the present claim.

However, Maa shows a silicided layer comprising a 20 to 130 Å layer of nickel and a 14 to 20 Å layer of cobalt (column 7, lines 3 – 10).

It would have been well known in the art of making semiconductor devices to form the workable or optimal range for the ratio of thickness of the cobalt layer to a thickness of the nickel layer ranges from about 9:1 to about 2:3 through routine design of experimentation (DOE) and optimization to obtain optimal device performance. In addition, the applicant has stated in the application description, [0027] lines 9 and 10 that “the ratio may vary depending on the application”.

10. Claim **18** is rejected under 35 U.S.C. 103(a) as being unpatentable over Amos et al. (US Patent No. 6,846,734) in view of Shimazu et al. (US Patent No. 6,686,274).

11. Regarding claim **18**, Amos discloses the claimed invention of claims 10 and 11 but fails to disclose a ratio of an atomic percent of the cobalt to a thickness of the nickel in the silicided gate ranges from about 9:1 to about 2:3 as cited in the present claim.

Shimazu shows an Ni-containing cobalt film 20 is preferably 0.05 to 50 atomic % (column 7, lines 30 – 36).

It would have been well known in the art of making semiconductor devices to form the workable or optimal range for a ratio of an atomic percent of the cobalt to a thickness of the nickel in the silicided gate ranges from about 9:1 to about 2:3 through routine design of experimentation (DOE) and optimization to obtain optimal device performance. In addition, the applicant has stated in the application description, [0027] lines 9 and 10, that “the ratio may vary depending on the application”.

Allowable Subject Matter

12. Claims **13 – 15** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. The following is an examiner’s statement of reasons for the indication of allowable subject matter: Claims **13 – 15** are allowable over the prior art of record because none of the prior art whether taken singularly or in combination, especially when these limitations are considered within the specific combination claimed, to teach:

Step of implanting a dopant into a blanket layer of polysilicon material (after forming silicided gate electrode (in claim 11)) to tune a work function of the silicided gate electrode as cited in claim 13 of set claims 13 – 15.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long K. Tran whose telephone number is 571-272-1797. The examiner can normally be reached on Mon-Thu.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on 571-272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Long Tran
November 18, 2005


David Nelms
Supervisory Patent Examiner
Technology Center 2800